Revista Espinhaço, 2016, 5 (2): 54-55.

Revista Espinhaço interviews Bette Otto Bliesner (NCAR Boulder)

Introduction Dr. Bette Otto Bliesner was interviewed by Revista Espinhaço during the BIARI 2016, that took place in Providence (US) at Brown University. To this special issue of Revista Espinhaço, Dr. Bliesner, researcher at the National Center for Atmospheric Research (NCAR) and expert in climate modeling and historic climate change, brings significant reflections about her recent work as an IPCC contributor. Kourosh Behzadian (University of West London), Douglas Sathler (FIH/Cegeo/UFVJM) and Lorena Fleury (UFRGS) conducted this interview.

Revista Espinhaço: How have you engaged in atmospheric and climate change studies?

I started atmospheric studies at College and have gained all my degrees in atmospheric science (Meteorology) from the University of Wisconsin-Madison (B.S. 1972, M.S. 1974, Ph.D. 1980). I became interested in climate modelling when I did a job for two-years in between M.S. and Ph.D. and worked with two famous climate change models. After my PhD, I became involved in the historic climate change, which includes both recent past and much deeper past. I am an expert in atmospheric science, which is associated with oceanography and geology.

Revista Espinhaço: Could you please tell us about the history of the climate change modelling? How can these models influence planning and policies considering their high levels of uncertainty?

The first climate model used atmospheric models only which showed what the ocean and land surfaces were doing. It was fine for that time as we could know about it. But once we did past climate, we had to make some assumptions. For example, if we wanted to look at very cold glacial climates, geologists would tell us how cold the ocean was. Then, over the time, we knew those interactions and influences are important but we were able then to take what the oceanographer had been doing with enhancing some models for oceans and the atmosphere in oceans. We coupled them together to get a full climate system. We have slowly been increasing the number of so-called component models with different spheres at the climate system together. Now, we have an ocean model, atmosphere model, CICE model, land surface model, all in one climate system model. We slowly added then earth system components model which predicts what the land and ice sheets are doing and models predict what the chemistry at the atmosphere is doing. We are slowly adding more and more types of interaction in our models. The first atmospheric model primary focused on weather models. Probably the first atmospheric climate models were in between 1960's and 1970's, and then they were just evolving and involving more expertise, but also we have had more sophisticated models.

I think the models are getting better. We do the projection center to the future. First, we should look at how well they can reproduce the historical/instrumental records from past climate changes. So, this can give us confidence and we also know about climate system has a lot of unforced variability due to the oceans and atmosphere interacting them. They are actually trying to use sort of initialize these models with the current states of the oceans and atmosphere particularly the oceans and see if they can predict out 10-20 years.

I think the model influencing planning in a country is dependent on the impact of climate change in the country. Some countries are very concerned (for example places in the Netherlands for planning and high sea level). They look at the projections of 20-30 years that would be important to them. I have talked to policy peoples and insurance people that believe they can plan for gradual changes, but they do want to know if something could broadly happen in terms of sea level. I think it is very important in some countries that what is actually happening for climate change or climate variability, such as being affected by drought. I wonder if they are dependent much on climate models or absorbing what has happened. Their concern is to look at the projections and what is happening now. There are uncertainties and we try to bracket those by looking at many models and what their projections are and see, looking at their uncertainties is and we do try to talk about uncertainties at these projections.

Revista Espinhaço: Could you please tell us about your experience working at IPCC reports?

I worked on the last three reports starting with the third assessment report. For that report, I was a contributing author and was not actually involved in the final writing but I contributed some expertise. In this report, we have the actual lead authors who are responsible for chapters. I enjoyed working on IPCC and it was a lot of work. If you look at IPCC reports, I think the most important parts are the chapters on how the atmosphere and oceans change, what is happening to prism sphere and aerosol and clouds, sea levels. My part was past climate changes and evaluation of the models. I learned a huge amount from just interacting

with those that have other expertise, such as sea level rise and how Greenland would melt. It is a really educational experience working with different genders and countries because IPCC really tries to engage authors with different expertise and life experiences. We were also told that the actual writing of the IPCC report will be informing policies. At least, within IPCC, we are trying to change the policy that does not mean the individual level you could not do that.

Revista Espinhaço: What are the next steps for the IPCC Working Group 1? What are their main challenges? Are there any key questions that still need to be answered?

Normally, what the IPCC committees have done in the past is that they call in for a scoping meeting. They bring in scientists with various expertise and discuss what should be the structure, should we do the same as they did last time (for example, the last time, between the fourth assessment and fifth assessment, they decided a separate chapter for sea levels), whether the emphasis of the chapter would be big as last time or small, etc. The way we write the IPCC is supposed to be an update of the last one as well. When we were writing a chapter that I worked on, past climate was not supposed to be a review of everything that ever been done but it was supposed to what we have learnt since the forth assessment. I am not sure what they are going to do until we have the scoping meeting. It is also the governments that really decide what they want to hear and some special report in between. The actual structure has not been decided (e.g. short or big). The good thing of a big report is that it can be used for education and some people use it for teaching purposes. The timeframe is usually every six years. Hence, the next one is supposed to be 2019 and might be stretched out to seven years (around 2020) and it would take a year to complete.

I think what we are gaining knowledge more and more about what are the threshold and vulnerability of the big ice sheets in Greenland. Until recently, we assumed they are going to be there forever and we know that this is not the case anymore. There are key things that may be new for us. I think what we are also learning about drought and water, and so on that would be new.

Revista Espinhaço: Why do you think some people still not accept the empirical evidence of climate change?

When I talk to others, some people do not want government intervention and some people are deeply religious and think somehow they can predict that what is going to happen a 100 years in the future. I think for some people it is not high priority in their life especially in the poor developing countries and they have other things and it is not that they do not accept it. They just are not high priority for day to day living. It is an interesting thing. When I talk to most people, they do realize and are willing to accept it. It is just a matter of getting those policy changes that we need to have and maybe floods and droughts that the US will finally convince. The key point what they do about it even if they accept it.

Revista Espinhaço: What are your feelings and perspectives for future concerning the main challenges of climate change?

I am hopeful and I think we are already at a point that we are going to get to deal for climate change. There is no question about that. We would learn to adapt to it and I hope that we come up with some technologies (e.g. desalination, biofuel and the amount of water we use, nuclear that is efficient, extraction of carbon out of the atmosphere, etc.). I do not think we should do things like geoengineering because there are too many alternatives, such as sea clouds for rainfall and re-realize that they are were some unintended consequences of doing it. It is fine to think about modelling it because it tells you “what if” we can do this and maybe there are safer ways.

I am generally optimist. Maybe because I live in the US but if you live on an island that is more often experiencing storm surges and flooding, that is not good. If you live in drought threatening areas in Africa, there are more consequences for those people in it and it is really harder to adapt. We really need to think about how we can provide technologies and resources to adapt. I think the US and more developed nations would come up with raise the benefits for them and would be able to reach out to these countries and maybe provide seeds/crops that are more resilient to drought and technologies that all help.

Revista Espinhaço: Thank you very much.